Thermal Energy Put to Work

Grade Levels:
7-9

Question:
Can thermal energy be made to do useful work?

Possible Hypotheses:
Thermal energy is/not useful energy that can be used for work.

Materials:
Plastic 1-liter bottle
Large balloon
Bowl of hot (not boiling) water
Bowl of ice water
Small rock

Procedure:
1. Cool the balloon and the bottle in the freezer for 5 minutes.
2. Fill the bowl with hot, not boiling, water.
3. Put the balloon over the mouth of the bottle making sure that the air has been squeezed from the balloon. Place the bottle into the hot water.
4. The air inside the bottle should expand and inflate the balloon. After it is inflated, put the bottle in the bowl of ice water and observe it deflate.
5. Design a device to convert this expansion and contraction into usable work, such as lifting a rock. Design a device that circulates hot, then cold, water so that the balloon deflates and inflates without moving the bottle.

Analysis and Conclusion:
Were you able to make a device that performed useful work? Can you think of devices that convert thermal energy into motion? Can you think of a way to convert thermal energy into electrical energy? Research internal combustion engines and turbine generators.